a device for the production of a secondary light source;

a mirror or lens device having a mirror or lens, which is organized into a raster element;

an optical element, which is arranged between said mirror or lens device and a reticule plane, whereby said optical element images said secondary light source in an exit pupil of the illumination system, wherein

said raster element of said mirror or lens is shaped and arranged in such a way that an image of said raster element covers a major portion of said reticule plane, and wherein said exit pupil is illuminated, and said exit pupil is defined by an aperture and a filling ratio.

54. The illumination system according to claim 53, wherein said optical element comprises at least one field mirror or at least one field lens.

55. The illumination system according to claim 54, wherein said optical element is at most two field mirrors or field lenses.

56. The illumination system according to claim 54, wherein said field mirror is arranged in striped incidence.

57. The illumination system according to claim 53, wherein said mirror or lens device comprises a mirror or a lens with a raster element formed as field honeycombs.

58. The illumination system according to claim 57, wherein said field honeycombs in their aspect ratio essentially correspond to that of a field to be illuminated in said reticule plane.

59. The illumination system according to claim 57, wherein said mirror or lens with said raster element produces said secondary light source.

60. The illumination system according to claim 53, further comprising a collector that collects light from said light source.

61. The illumination system according to claim 60, wherein said collector and said mirror or lens with said raster element produce said secondary light source.

62. The illumination system according to claim 53, wherein said light source radiates in a steradian greater than $\pi/2$.

63. The illumination system according to claim 53, wherein said light source radiates in a steradian smaller than $\pi/2$.

64. The illumination system according to claim 53, wherein said mirror or lens device comprises a first mirror or lens with a multiple number of field honeycombs and a second mirror or lens with a multiple number of pupil honeycombs.

65. The illumination system according to claim 64, wherein said field honeycombs are arranged on said first mirror or lens in such a way that they do not overlap and their images cover a surface to be illuminated in said reticule plane.

66. The illumination system according to claim 64, wherein said pupil honeycombs are arranged on said second mirror or lens in such a way that their images, which are produced by said optical element, illuminate said exit pupil with a predetermined pattern.

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67. The illumination system according to claim 66, comprising a light path between a pair of field and pupil honeycombs formed by rotating and tilting said field and said pupil honeycombs relative to one another.

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68. The illumination system according to claim 66, comprising a light path constructed between a pair of field and pupil honeycombs by orienting and selecting a deflection angle of a prismatic component of said field honeycombs and said pupil honeycombs.

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69. The illumination system according to claim 53, further comprising a zigzag beam path produced by field and pupil planes.

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70. The illumination system according to claim 53, wherein said mirror or lens device comprises a telescope system.

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71. The illumination system according to claim 70, wherein said mirror or lens comprises said raster element, and is one mirror or lens of said telescope system.

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72. The illumination system according to claim 70, wherein said telescope system comprises a collector mirror or collector lens.

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73. The illumination system according to claim 72, wherein said telescope system additionally comprises a first mirror or lens with a multiple number of field honeycombs, whereby said collector mirror or said collector lens has positive refractive power and said first mirror or lens has negative refractive power.

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74. The illumination system according to claim 70, wherein said telescope system comprises a first mirror or lens with a multiple number of field honeycombs and a second mirror or lens with a multiple number of pupil honeycombs, whereby said first mirror or lens has positive refractive power and said second mirror or lens has negative refractive power.

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75. The illumination system according to claim 53, further wherein a distance from said light source to a field to be illuminated is smaller than 3 m.

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76. The illumination system according to claim 53, wherein said illumination system comprises three to five mirrors, and wherein at least one mirror has striped incidence and at least one mirror has said raster element.

27 1
77. The illumination system according to claim 53, wherein said illumination system comprises four to five mirrors, and wherein at least two mirrors have grazing incidence and at least two mirrors have said raster elements.

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78. The illumination system according to claim 53, wherein said raster element of said mirror is curved.

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79. The illumination system according to claim 53, wherein said raster element of said mirror is planar.

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80. The illumination system according to claim 53, wherein said raster element of said mirror has a surface that is arranged on a curved surface.

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81. The illumination system according to claim 53, wherein said raster element of said mirror is arranged on a basic structure according to a type of Fresnel lens.

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82. The illumination system according to claim 53, wherein said raster element of said mirror is tilted relative to an enveloping or bearing surface.

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83. The illumination system according to claim 53, wherein said mirror is comprised of at least two raster elements, said at least two raster elements are arranged in rows and each adjacent row is displaced relative to the other adjacent row by a fraction of a length of one of said raster elements.

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84. The illumination system according to claim 53, wherein said light source has a steradian component of light radiated of 0.5 π transported to a field.

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85. The illumination system according to claim 53, wherein said mirror device has an axial symmetric construction with central vignetting.

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86. The illumination system according to claim 53, wherein said mirror device has an outer axial course of a light bundle that is free of vignetting.

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87. The illumination system according to claim 53, wherein said raster element has an aspect ratio of 1:1 to 1:20.

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88. The illumination system according to claim 53, wherein the illumination system has a field that is a rectangular field or an annular segment.

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39 89. The illumination system according to claim 53, wherein said mirror has a toroidal form, whereby cross sections can also have conical and aspherical components.

40 90. The illumination system according to claim 53, further comprising an optical element that has a function selected from the group consisting of imaging a secondary light source in an entrance pupil of a subsequent projection objective, remodeling a pre-given rectangular illumination by raster elements to form a field in a form of an annular segment, adjusting an intensity distribution over said field, and mixtures thereof.

41 91. The illumination system according to claim 53, wherein said mirror has a reflectivity that is position-dependent.

42 92. The illumination system according to claim 53, further comprising a field-side numerical aperture that amounts to approximately 0.01 to 0.1.

43 93. The illumination system according to claim 53, further comprising an accessible diaphragm plane.

44 94. The illumination system according to claim 43, further comprising a masking device at said diaphragm plane, with which a type of illumination can be adjusted.

45 95. The illumination system according to claim 53, wherein said light source is a synchrotron radiation source.

46 96. The illumination system according to claim 45, wherein said light source is an undulator source or a wiggler source.

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97. EUV projection exposure unit for microlithography with an illumination system according to claim ~~93~~ 1 comprising a mask on a carrier system, a projection objective, and a light-sensitive object on a carrier system.

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98. The EUV projection exposure unit according to claim ~~97~~, wherein the unit is a scanning system.

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99. The EUV projection exposure unit according to claim ~~97~~, further comprising an illumination intensity at said light-sensitive object, with an unstructured mask, that has position-dependent differences of less than ± 5%.

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100. The EUV projection exposure unit according to claim ~~97~~, further comprising a scan energy at said light sensitive object, with an unstructured mask, that has position-dependent differences of less than ± 5%.

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101. The EUV projection exposure unit according to claim ~~97~~, further comprising a vacuum window transparent to EUV that is arranged in a beam path.

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102. The EUV projection exposure unit according to claim ~~101~~, wherein said vacuum window is arranged at a constriction of a light bundle in said illumination system.

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103. A process for designing an illumination system for wavelengths ≤ 193 nm, said illumination system having:

a light source with any desired illumination in a predetermined surface,

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a mirror or lens device having at least two mirrors or lenses, with each mirror or lens organized into a raster element,

an optical element arranged between said mirror or lens device and a reticule plane,

said process comprising the following steps:

arranging said raster element of a first mirror or lens to cover said surface without overlapping;

shaping said raster element of said first mirror or lens such that its form corresponds to that of a field to be illuminated, whereby a secondary light source is assigned to each said raster element;

arranging said raster element of a second mirror or lens to a postion at said secondary light source;

shaping said raster element of said second mirror or lens such that its form corresponds to that of said secondary light source;

rotating or tilting said raster elements of said first and second mirrors or orienting and selecting an angle of deflection of a prismatic component of said raster elements of said first or second lens, a light path being produced, whereby a predetermined assignment of said raster elements of said first mirror or lens to said second mirror or lens is maintained, so that

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